

Claims:

1. An air bag apparatus (1) for a vehicle, comprising:

5 an air bag body (3) including a first chamber and a second chamber each arranged along a roof side rail (10) in a front to rear direction of a vehicle, the first chamber being situated adjacent to a pillar member (14,15) in the vehicle, and

a fluid supply delay device (20) attached to the airbag body (3) for delaying
10 supply of a high-pressure fluid to the first chamber as compared to that of the high-pressure fluid supplied to the second chamber so that the second chamber is fully inflated before the first chamber is fully inflated.

2. The air bag apparatus (1) of claim 1, wherein:

15 the air bag body (3) is folded in an upward direction in a normal state, each of the first chamber and the second chamber being inflated with the high-pressure fluid supplied to the airbag body (3) in an emergency state so that each of the first chamber and the second chamber deploys in a downward direction along a side wall of the vehicle.

20 3. The air bag apparatus (1) of claims 1 and 2, wherein,

the fluid supply delay device (20) includes a duct having a first outlet port (4a) communicating with a first inlet port (2a) of the first chamber and a second outlet port communicating with a second inlet port of the second chamber, the first outlet port
25 having an opening area smaller than that of the second outlet port.

4. The air bag apparatus (1) of any previous claim, wherein:

the fluid supply delay device (20) includes a passage communicating with a
30 first inlet port (2a) of the first chamber and a second inlet port (2a) of the second chamber, and a duct (4) inserted onto the passage and having a first outlet port communicating with the first inlet port and a second outlet port communicating with the second inlet port, the first outlet port being closed so that the high-pressure fluid is supplied to the first chamber only through the passage.

5. An air bag apparatus (1) of any previous claim,
the air bag comprising an air bag body (3), an inflator means (5), the inflator means (5) being in fluid communication with the air bag body (3), and a fluid supply delay means (20);

5 the air bag body (3) comprising a plurality of inflatable chambers (2), wherein each of the inflatable chambers (2) comprises a fluid inlet port (4a),

the plurality of inflatable chambers (2) comprising at least one specific chamber (2P) and at least one general chamber (2Q), wherein when in the deployed state the at least one specific chamber (2P) is positioned adjacent to a pillar member
10 (14,15) of a vehicle side portion of the vehicle body and wherein when in the deployed state the at least one general chamber (2Q) is located adjacent to a side-wall of the vehicle side portion,

wherein, in use, the inflator means supplies a high-pressure fluid to the air bag body (3) thereby inflating each of the plurality of inflatable chambers (2) and wherein
15 the fluid supply delay means (20) selectively delays the supply of the high-pressure fluid to the at least one specific chamber (2P) relative to the at least one general chamber (2Q).

6. The air bag apparatus (1) of claim 5, wherein the fluid supply delay means
20 (20) comprises a flexible duct (4) member, the duct (4) member comprising a plurality of fluid outlet ports (4a), which fluid outlet ports (4a) communicate with the fluid inlet port (4a) on each of the plurality of inflatable chambers (2).

7. The air bag apparatus (1) of claim 5, wherein the fluid supply delay means
25 (20) comprises a flexible duct (4) member, the duct (4) member comprising a plurality of fluid outlet ports (4a), which fluid outlet ports (4a) communicate with the fluid inlet port (4a) on each of the at least one general chamber (2Q).

8. The air bag apparatus (1) of claim 5, wherein the fluid supply delay means
30 (20) comprises a flexible duct (4) member, the duct (4) member comprising a plurality of fluid outlet ports (4a), which fluid outlet ports (4a) communicate with the fluid inlet port (4a) on each of the plurality of inflatable chambers (2), and wherein the diameter of the fluid outlet ports (4a) that are in communication with each of the at

least one general chamber (2Q) is greater than the diameter of the of the fluid outlet ports (4a) that are in communication with the at least one specific chamber (2P).

9. An air bag apparatus (1) adapted so as to be suitably located along the front-to-rear axis of an interior roof side rail (10) on a vehicle body,

the air bag comprising an air bag body (3), an inflator means (5), the inflator means (5) being in fluid communication with the air bag body (3), and a fluid supply delay means (20) located between the inflator means (5) and the air bag body (3);

the air bag body (3) comprising a plurality of inflatable chambers (2) defined along the front-to-rear axis of the vehicle body, wherein each of the inflatable chambers (2) comprises a fluid inlet port (4a),

the plurality of inflatable chambers (2) comprising at least one specific chamber (2P) and at least one general chamber (2Q), wherein when in the deployed state the at least one specific chamber (2P) is positioned adjacent to a pillar member (14,15) of a vehicle side portion of the vehicle body and wherein when in the deployed state the at least one general chamber (2Q) is located adjacent to a side-wall of the vehicle side portion,

the air bag body (3) being stowed in an upward direction when in an undeployed state,

wherein on deployment the inflator means (5) supplies a high-pressure fluid to the air bag body (3) thereby inflating each of the plurality of inflatable chambers (2) in the downward direction along the side portion of the vehicle body, and wherein the fluid supply delay means (20) selectively delays the supply of the high-pressure fluid to the at least one specific chamber (2P) relative to the at least one general chamber (2Q).

10. The air bag apparatus (1) of claim 9, wherein the air bag body (3) comprises an elongate passage, the elongate passage being in fluid communication with the plurality of inflatable chambers (2), and wherein the elongate passage is adapted to receive the fluid supply delay means (20).

11. The air bag apparatus (1) of claim 10, wherein the fluid supply delay means (20) comprises a flexible duct (4) member, the duct (4) member comprising a plurality

of fluid outlet ports (4a), which fluid outlet ports (4a) communicate with the fluid inlet port (4a) on each of the plurality of inflatable chambers (2).

12. The air bag apparatus (1) of claim 10, wherein the fluid supply delay means (20) comprises a flexible duct (4) member, the duct (4) member comprising a plurality of fluid outlet ports (4a), which fluid outlet ports (4a) communicate with the fluid inlet port (4a) on each of the at least one general chamber (2Q).

13. The air bag apparatus (1) of claim 10, wherein the fluid supply delay means (20) comprises a flexible duct (4) member, the duct (4) member comprising a plurality of fluid outlet ports (4a), which fluid outlet ports (4a) communicate with the fluid inlet port (4a) on each of the plurality of inflatable chambers (2), and wherein the diameter of the fluid outlet ports (4a) that are in communication with each of the at least one general chamber (2Q) is greater than the diameter of the of the fluid outlet ports (4a) that are in communication with the at least one specific chamber (2P).

14. The air bag apparatus (1) of any previous claim, wherein the air bag body (3) is made from a fabric material.

15. The air bag apparatus (1) of claim 14, wherein the air bag body (3) is made from canvas.

16. The air bag apparatus (1) of any previous claim, wherein the high-pressure fluid is a gas.

17. A motor vehicle comprising an air bag apparatus (1) as claimed in any of claims 1 to 16.

18. An air bag apparatus adapted so as to be suitably located along the front-to-rear axis of an interior roof side rail on a vehicle body,

the air bag comprising an air bag body, an inflator, the inflator being in fluid communication with the air bag body, and a fluid supply delay arrangement located between the inflator and the air bag body;

the air bag body comprising a plurality of inflatable chambers defined along the front-to-rear axis of the vehicle body, wherein each of the inflatable chambers comprises a fluid inlet port,

the plurality of inflatable chambers comprising at least one specific chamber
5 and at least one general chamber, wherein when in the deployed state the at least one specific chamber is positioned adjacent to a pillar member of a vehicle side portion of the vehicle body and wherein when in the deployed state the at least one general chamber is located adjacent to a side-wall of the vehicle side portion,

the air bag body being stowed in an upward direction when in an undeployed
10 state,

wherein on deployment the inflator supplies a high-pressure fluid to the air bag body thereby inflating each of the plurality of chambers in the downward direction along the side portion of the vehicle body, and wherein the fluid supply delay arrangement selectively delays the supply of the high-pressure fluid to the at
15 least one specific chamber relative to the at least one general chamber.

19. The air bag apparatus of claim 18, wherein the air bag body comprises an elongate passage, the elongate passage being in fluid communication with the plurality of inflatable chambers, and wherein the elongate passage is adapted to
20 receive the fluid supply delay arrangement.

20. The air bag apparatus of claim 19, wherein the fluid supply delay arrangement comprises a flexible duct member, the duct member comprising a plurality of fluid outlet ports, which fluid outlet ports communicate with the fluid inlet port on of each
25 of the plurality of inflatable chambers.

21. The air bag apparatus of claim 19, wherein the fluid supply delay arrangement comprises a flexible duct member, the duct member comprising a plurality of fluid outlet ports, which fluid outlet ports communicate with the fluid inlet port on each of
30 the at least one general chambers.

22. The air bag apparatus of claim 19, wherein the fluid supply delay arrangement comprises a flexible duct member, the duct member comprising a plurality of fluid outlet ports, which fluid outlet ports communicate with the fluid inlet port on each of

the plurality of inflatable chambers, and wherein the diameter of the fluid outlet ports that are in communication with each of the at least one general chambers is greater than the diameter of the fluid outlet ports that are in communication with the at least one specific chambers.

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23. The air bag apparatus of claim 18, wherein the air bag body is made from a fabric material.

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24. The air bag apparatus of claim 18, wherein the air bag body is made from canvas.

25. The air bag apparatus of claim 18, wherein the high-pressure fluid is a gas.

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26. An air bag apparatus adapted so as to be suitably located along the front-to-rear axis of the interior facing side roof rail of a vehicle body,

the air bag comprising an air bag body, an inflator, the inflator being in fluid communication with the air bag body, and a fluid supply delay arrangement;

the air bag body comprising a plurality of inflatable chambers, wherein each of the inflatable chambers comprises a fluid inlet port,

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the plurality of inflatable chambers comprising at least one specific chamber and at least one general chamber, wherein when in the deployed state the at least one specific chamber is positioned adjacent to a pillar member of a vehicle side portion of the vehicle body and wherein when in the deployed state the at least one general chamber is located adjacent to a side-wall of the vehicle side portion,

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wherein, in use, the inflator supplies a high-pressure fluid to the air bag body thereby inflating each of the plurality of chambers and wherein the fluid supply delay arrangement selectively delays the supply of the high-pressure fluid to the at least one specific chamber relative to the at least one general chamber.

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27. The air bag apparatus of claim 26, wherein the fluid supply delay arrangement comprises a flexible duct member, the duct member comprising a plurality of fluid outlet ports, which fluid outlet ports communicate with the fluid inlet port on each of the plurality of inflatable chambers.

28. The air bag apparatus of claim 26, wherein the fluid supply delay arrangement comprises a flexible duct member, the duct member comprising a plurality of fluid outlet ports, which fluid outlet ports communicate with the fluid inlet port on each of the at least one general chambers.

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29. The air bag apparatus of claim 26, wherein the fluid supply delay arrangement comprises a flexible duct member, the duct member comprising a plurality of fluid outlet ports, which fluid outlet ports communicate with the fluid inlet port on each of the plurality of inflatable chambers, and wherein the diameter of the fluid outlet ports that are in communication with each of the at least one general chambers is greater than the diameter of the fluid outlet ports that are in communication with the at least one specific chambers.

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30. The air bag apparatus of claim 26, wherein the air bag body is made from a fabric material.

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31. The air bag apparatus of claim 26, wherein the air bag body is made from canvas.

32. The air bag apparatus of claim 26, wherein the high-pressure fluid is a gas.

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33. An air bag apparatus for a vehicle, comprising:

an air bag body including a first chamber and a second chamber each arranged along a roof side rail in a front to rear direction of a vehicle, the first chamber being situated adjacent to a pillar member in the vehicle, and

a fluid supply delay device attached to the airbag body for delaying supply of a high-pressure fluid to the first chamber as compared to that of the high-pressure fluid supplied to the second chamber so that the second chamber is fully inflated before the first chamber is fully inflated.

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34. The air bag apparatus of claim 33, wherein:

the air bag folded in an upward direction in a normal state, each of the first chamber and the second chamber being inflated with the high-pressure fluid supplied to the airbag body in an emergency state so that each of the first chamber and the second chamber deploys in a downward direction along a side wall of the vehicle.

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35. The air bag apparatus of claim 33, wherein,

the fluid supply delay device includes a duct having a first outlet port communicating with a first inlet port of the first chamber and a second outlet port
10 communicating with a second inlet port of the second chamber, the first outlet port having an opening area smaller than that of the second outlet port.

36. The air bag apparatus of claim 33, wherein:

15 the fluid supply delay device includes a passage communicating with a first inlet port of the first chamber and a second inlet port of the second chamber, and a duct inserted onto the passage and having a first outlet port communicating with the first inlet port and a second outlet port communicating with the second inlet port, the first outlet port being closed so that the high-pressure fluid is supplied to the first
20 chamber only through the passage.

37. A motor vehicle comprising an air bag apparatus as claimed in claim 18, claim 26 or claim 33.